STORMWATER MANAGEMENT REPORT

West Hartford Fellowship Housing Redevelopment
10-60 Starkel Road
West Hartford, Connecticut

May 2019

PREPARED FOR:

The Town of West Hartford
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1.0 INTRODUCTION

This Stormwater Management Report contains the engineering design of the stormwater management systems for the proposed redevelopment of the West Hartford Fellowship Housing development, located from 10-60 Starkel Road in West Hartford, Connecticut. (Figure 1 – Site Location Map). The existing facility, which consists of multiple small residence buildings spaced around the property, will be renovated to accommodate six new multi-story residence buildings, interconnected with entry vestibules to create a single residence community. A seventh, existing building on the southwestern corner of the property will be maintained, albeit renovated and improved as part of the project. The engineering design and report are prepared in accordance with Town of West Hartford Regulations, the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, the 2004 Connecticut Department of Energy & Environmental Protection (CT DEEP) Water Quality Manual, and the 2000 Connecticut Department of Transportation (ConnDOT) Drainage Manual.

2.0 EXECUTIVE SUMMARY

This report is prepared for The Town of West Hartford in support of the West Hartford Fellowship Housing proposed redevelopment. It addresses the impacts and drainage mitigation for the increase in site impervious caused by the new building complex and its appurtenances.

The following stormwater management facilities are designed in accordance with the Town of West Hartford in coordination with their engineering department, the West Hartford Zoning Regulations, CT DEEP, and ConnDOT Drainage Standards:

- As part of the construction, total site impervious area has been increased. Therefore, peak flows for the two, five, ten, 25, 50, and 100-year design storms have been mitigated.
- On-site stormwater collection and conveyance is accomplished by a series of catch basins, manholes, piping, water quality units and underground detention facilities evenly spaced throughout the property.
- Short-term erosion control is achieved through use of construction entrances, inlet protection, silt fence and hay bale barriers, and temporary diversion swales.
- A stormwater treatment train is provided, including parking lot sweeping, catch basins with two (2) foot sumps for sediment collection, hydrodynamic separators, and open bottom infiltrating underground detention areas. All stormwater runoff from the proposed development will be directed to the proposed site drainage and management system, where it will pass through water quality units and detention systems before ultimately discharging from the site.
- Stormwater drainage piping has been designed to convey the 10-year design storm in accordance with the Town of West Hartford Engineering Department.

3.0 PROJECT DESCRIPTION

This project involves the renovation of an existing residential development containing 22 smaller, separated residence buildings spread over a 9.04 acre parcel into a 7 building interconnected residence community. In addition to the entirely reconstructed building complex, the site will be improved with a new loop drive parking layout for enhances circulation, an interior courtyard with activity spaces for an improved sense of community, and extensive native landscaping to tie the development to the surrounding landscape. The total area of construction activity (disturbed area) is approximately 8.3 acres.

Storm drainage and runoff control will be accomplished by directing site overland runoff to a series of area drains and catch basins, then via underground piping to the underground detention systems. The discharge of the collected stormwater from the site will utilize two existing pipes that tie into the drainage system in King Phillip Drive to the east of the property.

EXISTING CONDITIONS

3.1 Characteristics

The project site consists of an approximately 9.04 acre parcel located off of Starkel Road in West Hartford, Connecticut, with existing buildings developed around the site with various areas of sidewalk, pavement, and random grassed areas. The property is bound by Starkel Road to the West, Single Family Homes immediately adjacent to the property to the North, and various condominium and apartment complexes to the South and Southeast. Along the Northeast corner of the site down a 20-foot decent runs King Phillip drive from southeast to northwest. Existing property access is off Starkel Road.

The site generally slopes downward to the east throughout the entire property. The highest elevation onsite is at Starkel Road at elevation ±142, adjacent to Building 7, at which point it starts to slope down to elevation ±129 over approximately 760 feet. The remaining 55 feet to the property line drops off an additional 20 feet down to elevation 109 on King Phillip Drive.

3.2 Soil

Following research of the USDA-NRCS Web-soil Survey online database, approximately 90 percent of the site is recorded as Udorthents - Urban Land Complex. The main characteristic of Udorthents is that the material present is not the native soil formation. Representative areas typically have been cut or filled by at least two feet above or below the original soil landmass. With Urban Land complex, typically non-native, inorganic components are included in the Udorthents fill material, that could represent construction debris or general fill from large amounts of historical earthwork. According to the online database, Udorthents - Urban land complex is generally considered a Hydrologic Soil Group B, however, for the purposes of this analysis based on anecdotal information provided by Town Staff, we are representing Udorthents -Urban Land Complex as Hydrologic Soil Group D.

The remaining 10 percent of the site, located along the north border and north access drive of the site, is identified as Rainbow – Urban Land Complex. This complex is identified to have a hydrologic soil group range between C and D. For the purposes of this analysis, the site will be considered hydrologic group D.

3.3 Wetlands

Upon review of the West Hartford Geographic Information System (GIS) Mapping, there are no wetlands located on the property, but there are wetlands identified across King Phillip Drive east of the site. The proximity of the wetlands to the project site will put a small portion of the site (± 0.65 Ac – 0.7% of the property) located within a designated Upland Review Area. Approximately 0.38 acres of this Upland Review Area will be located within the limits of disturbance for the project. We do not anticipate that the site improvements will have any impact on the regulated areas on or off site.

3.4 Hydrology

The existing condition for the site shows there are three (3) distinct discharges from the property:

1. 24” drainage pipe running along the north boundary of the site before exiting the property, ultimately discharging into a manhole on King Phillip Drive. The tributary area for this discharge will be modeled as Existing Subwatershed “E1”.

2. 12” drainage pipe approximately 110 feet southeast of the 24” pipe. This pipe also ultimately discharges to a manhole on King Phillip Drive. The tributary area for this discharge will be modeled as Existing Subwatershed “E2”.

3. Overland sheet flow runoff on the far east portion of the site. This area, to the east of the existing and proposed buildings. sheet flows offsite before ultimately discharging onto King Phillip Drive, where it will flow along the gutter to the nearest catch basin to the south. The tributary area for this overland discharge will be modeled as Existing Subwatershed “E3”.

For the purposes of this stormwater analysis, we are modeling the existing and proposed development connection to the 24” drain, the 12” drain, and the overland sheet flow as the three Design Points #1, #2, and #3 respectively. Please see Appendix A for the Existing Watershed Area Table and Figure 2 for the Existing Watershed Area Map.

4.0 STORMWATER MANAGEMENT

4.1 Design Objective

The intent of the project hydrologic study is to determine rates of runoff for maximum storm frequencies of two, ten, twenty-five, fifty, and one hundred-year intervals under existing and proposed conditions for the designated design points. From this analysis, the proposed stormwater collection and management system is designed to mitigate the post development increase in the peak rates of runoff for the above-mentioned storm events associated with the construction of new buildings, driveways, and sidewalks.

4.2 Design Criteria

This project has been designed in accordance with the Town of West Hartford requirements.

The following rainfall volume for hydrologic analysis were used for each storm event for a 24-hour type III duration Storm:

2-year – 3.21 in
5-year – 4.27 in
10-year – 5.14 in
25-year – 6.35 in
50-year – 7.27 in
100-year – 8.20 in

* Source: NOAA Atlas 14 Point Precipitation Frequency/Volume Estimates

4.3 Design Methodology

This study was prepared using methods contained in the USDA Soil Conservation Service Publication TR-55 "Urban Hydrology for Small Watersheds". TR-55 outlines procedures for calculating peak rates of runoff resulting from precipitation events and procedures for developing runoff hydrographs.

The watershed was simulated as a series of contributing subcatchments, and inflow and outflow structures. A value for area, curve number (CN) and time of concentration (Tc) was calculated for each contributing subcatchment.

The curve number is a land sensitive coefficient that dictates the relationship between total rainfall depth and direct storm runoff. Based on the coverage of soil groups and land use in the watershed, an average CN was determined for each subcatchment under existing and proposed conditions.

The time of concentration is defined as the time for runoff to travel from the hydraulically most distant point in the watershed to a point of interest. Values for the time of concentration were determined for existing and proposed conditions based on land cover and slope of the flow path using methods described in TR-55.

Values for time of concentration (Tc) and curve numbers (CN) were then entered into the "HydroCAD 10.0" computer program (which is based on TR-20 and TR-55) where subcatchment hydrographs were calculated. The hydrological analysis consists of developing an existing conditions model to first establish existing peak rates of runoff for the various storm events mentioned above. Second, an evaluation is then conducted of the proposed condition to determine the effect of the development on the sites peak rates of runoff.

4.4 Existing Conditions

Area, Curve Number, and Tc of the Three existing subwatersheds can be seen in the table below:

Watershed	Area (ac)	C	Tc (min.)
E1	7.36	88	6.0
E2	0.94	90	6.0
E3	0.74	80	6.0
TOTAL	**9.04**	**87.5**	

Existing stormwater discharge computations are located in Appendix A. The existing watershed areas are depicted in Figure 2.

4.5 Proposed Conditions

The intent of the hydrologic design was to maintain or reduce the peak flow rate exiting the site. To achieve mitigation of the peak flow rates, the proposed site was divided into five (5) subwatersheds.

Four of these subwatersheds direct flow to the four underground detention systems that are design to detain water and reduce the total discharge for each design storm. The fifth area discharges via sheet flow to the eastern edge of the site. Of those four watersheds, three (P1-1, P1-2, and P1-4) ultimately discharge to the 24" pipe at Design Point #1. The fourth subwatershed ultimately discharges to the 12" pipe at Design Point #2.

The fifth subwatershed accounts for the remaining overland flow discharge to the east that does not enter the site drainage system. The total tributary area of the overland flow portion of the site is reduced from 0.74 acres to 0.60 acres, therefore the total peak flow for Design Point #3 is reduced.

Cover characteristics of each subwatershed can be seen in the table below:

Subwatershed	Area (ac)	CN	Tc (min.)
P1-1*	2.42	92	6.0
P1-2	3.13	90	6.0
P1-4	1.82	93	6.0
P2-3	1.08	94	6.0
P3	0.60	80	6.0
Total	**9.04**	**91**	**-**

* "P1-1" naming convention represents "Proposed Design Point 1 – Phase 1" for all subwatersheds.

Proposed stormwater discharge computations are represented in Appendix A. The proposed subwatershed areas are depicted in Figure 3.

4.6 Stormwater Detention

It is the intent of the developers of this project to construct this project in phases. As a result, the drainage system for each phase was designed and located on the site to function individually of the remaining phases. As a result, four separate underground detention areas are proposed for each phase of the project:

<u>Phase 1</u>: Southwest – Buildings 1, 2 and 7 and associated areas
<u>Phase 2</u>: Northwest – Buildings 6 and 5 and associated areas
<u>Phase 3</u>: Southeast – Building 3 and associated areas
<u>Phase 4</u>: Northeast – Building 4 and associated areas

The specific size of each detention area may increase or decrease marginally as each phase comes on-line. However, the full build analysis included with this report will set the minimum cumulative storage volume that the full build condition needs to achieve at project completion to ensure the peak flow for the overall site will be reduced.

Following completion of the analysis, this cumulative storage shall be ±23,300 cubic feet of available storage. Underground stormwater galley storage systems will be utilized to create this storage volume.

For these detention areas, the primary outflow from each system is as follows:

Phase 1 – System 1: 24" Outlet Pipe (Design Point #1)
Phase 2 – System 2: 24" Outlet Pipe (Design Point #1)
Phase 3 – System 3: 12" Outlet Pipe (Design Point #2)
Phase 4 – System 4: 18" Outlet Pipe (Design Point #1)

These primary outlet pipes function as the outlet control for each detention system. As each storm enters and fills-up the detention area, the outlet pipe restricts the inflow rate enough to reduce the overall peak flow out of the system while minimizing the required cumulative storage area for each system. As the storm magnitude increases, the outlet pipe surcharges and continues to reduce the peak flow out of the system, while the detained flow is stored within the underground storage volume. Stormwater detention computations are included in Appendix B.

4.7 Pre- and Post-Comparison

Peak flows at the off-site analysis point are shown in the following table:

Comparison of Existing to Proposed				
Design Point	**Storm Event (Type III)**	**Discharge Existing (cfs)**	**Discharge Proposed (With Detention)**	**Discharge Difference (cfs)**
1	**2-year**	17.24	17.21	-0.04
	5-year	25.34	24.42	-0.92
	10-year	32.00	29.79	-2.21
	25-year	41.23	36.82	-4.41
	50-year	48.21	42.13	-6.08
	100-year	55.23	47.93	-7.30
2	**2-year**	2.37	1.84	-0.53
	5-year	3.41	2.36	-1.05
	10-year	4.26	2.75	-1.51
	25-year	5.43	3.28	-2.15
	50-year	6.31	3.74	-2.57
	100-year	7.20	4.25	-2.95

3	**2-year**	1.21	0.98	-0.23
	5-year	1.97	1.60	-0.37
	10-year	2.62	2.12	-0.50
	25-year	3.54	2.87	-0.67
	50-year	4.24	3.44	-0.80
	100-year	4.96	4.04	-0.94

The data summarized above indicates that the total peak stormwater discharge will be reduced from the existing condition to the proposed conditions for all design storms

5.0 STORMWATER DRAINAGE SYSTEM

5.1 Design Criteria

Design of the storm drainage system was performed in accordance with the standards and procedures specified in the 2000 ConnDOT Drainage Manual and in coordination with the Town of West Hartford. The capacity within the site driveways and parking lots were designed to safely accommodate the 10-year, 24-hour design storm.

5.2 Design Methodology

The storm drain collection system was analyzed using the Rational Method for estimating runoff for a 10-year design storm. The project site was divided into catchment, with each contributing runoff to an individual catch basin or area drain inlet. A value for acreage area, time of concentration, and a runoff coefficient was calculated for each contributing catchment area.

Values for time of concentration were chosen based on land cover and slope of the flow path from the hydraulically most distant point in the sub-area to the appropriate inlet. Per Rational Method, the minimum time of concentration value is assumed to be 5 minutes. Using the time of concentration, rainfall intensities were determined using the Rainfall-Duration-Frequency Relationships for Connecticut (NOAA Atlas 14 Precipitation Frequency Estimates).

The average runoff coefficient, which is the ratio of peak runoff rate to the average rainfall rate for the period known as the time of concentration, was chosen using the following values:

Condition	C
Grass/Landscaped Areas	0.30
Pavement/Impervious Areas	0.90

Storm drainage pipes were then sized based upon calculated flows using Manning's Equation and the pipe sizes verified by solving for the hydraulic grade line. The drainage pipe materials proposed for this project are high density polyethylene pipe (HDPE) and reinforced concrete pipe.

Per the ConnDOT Drainage Manual (Table 6.C.1), the friction factor (n) utilized in the design is 0.011 for HDPE pipe abd 0.013 for RC Pipe.

5.3 Storm Drain Discharge Summary

Detailed calculations for the on-site stormwater sizing are included in this report in Appendix C. A Catchment Area Map has also been included (Figure 4) to detail the tributary area for each drainage structure.

6.0 STORMWATER QUALITY

The project has been designed to address both the short-term and long-term storm water quality. During construction, stormwater runoff is a concern due to the excess amount of exposed areas that do not have vegetation or other cover to prevent the removal and transportation of sediment to resource areas. The project addresses the short-term concerns by providing erosion control measures in the form of Erosion & Sediment Control Plans and a “During Construction” Operation and Maintenance Plan (Section 8.0).

Because this project will be split into separate construction phases, a detailed erosion and sedimentation control plan will be required for each phase to appropriately control discharges to both the existing and proposed site drainage. In the meantime, a generalized erosion and sedimentation control plan will be prepared for the full building condition. Please see Sheet C-1.0 in the permitting submission set for the full building erosion and sedimentation control plan.

The primary function of erosion and sediment control, as defined by the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control is to “absorb erosional energies and reduce runoff velocities that force the detachment and transport of soil and/or encourage the deposition of eroded soil particles before they reach any sensitive area.” The short-term project erosion measures were designed per the 2002 manual.

After construction, stormwater runoff is a concern because it may contain contaminants such as suspended solids, petroleum hydrocarbons, nutrients, heavy metals, and salts that may have adverse effects on water quality. The sources of the pollutants are generally associated with urban land use, including automobile exhaust, mechanical wear of vehicles, leaf litter, deicing salts and atmospheric deposition. The pollutants accumulate on the land surfaces and are washed off during storm events into the receiving waterways and wetlands.

The objective of the stormwater management system designed for the proposed development is to effectively remove the contaminant loading from the site runoff and to provide long-term protection of the quality and use of downstream water resources. The long-term stormwater quality measures were designed per the 2004 Connecticut Stormwater Quality Manual.

6.1 Temporary Control of Sediment and Erosion

The objective of temporary erosion control during construction is to minimize the area of exposed soil, control runoff rate and direction, and provide for rapid stabilization of exposed areas. Prior to any construction activity, trenched silt fence and/or staked hay bales will be placed down gradient of the proposed work areas. The fence/barrier will provide some sediment control, as well as provide a limit of construction activity.

Construction entrances will be utilized to remove sediment from construction vehicle tires and prevent it from being tracked onto adjoining paved roadway areas.

Any excavated and stockpiled topsoil will be contained within staked silt fence. Erosion-prone areas left exposed for extended periods (>30 days) will be mulched and seeded for temporary vegetative cover. After construction, all exposed areas will be graded, mulched and re-vegetated with appropriate ground cover. The silt fence and/or hay bales will remain in place until groundcover is established.

Catch basin filter inserts will be used to collect sediment that may be carried in the storm runoff during construction. Filter inserts will be placed in each existing catch basin, yard drain, and in each new catch basin, during construction and until all disturbed areas of the site have been stabilized. Replacement of the filter inserts shall be as often as necessary to prevent excessive ponding due to clogged fabric.

Dewatering settling basins will be utilized where groundwater is encountered in trenching, foundation excavation, or any other excavation. The dewatering wastewaters will be infiltrated into the ground or discharged, after filtration into the nearest catch basin.

Throughout all phases of construction, the erosion control measures will be routinely inspected and cleaned, repaired, and replaced as necessary by the Contractor. See Section 8.0 entitled "Operation and Maintenance Plan" for more details.

Throughout the construction process, extra stocks of hay bales and silt fence will be kept on-site to replace those that become damaged and/or deteriorated.

Any erosion and sediment control measures, which upon inspection are found to be damaged, deteriorated, or not functioning properly, will be repaired, replaced, and corrected immediately after inspection.

Areas mulched or seeded for temporary vegetative cover will be inspected for proper cover at the end of each workday if precipitation is forecast and also prior to weekends. Additional seeding or mulch will be placed as necessary.

The temporary erosion and sediment control systems will not be removed until all stormwater drainage system components are in place, cleaned and working properly and until permanent vegetative cover and other stabilization measures are established.

6.2 Permanent Control of Stormwater Quality

The design intent of the 2004 Connecticut Stormwater Quality Manual is to provide a "stormwater treatment train," where stormwater quality is achieved through a series of treatment measures. Harmful pollutants, such as sediment, pathogens, organic material, hydrocarbons, metals, synthetic organic chemicals and deicing compounds, are carried by the low-flow storms. Many of these pollutants are associated with vehicular exhaust, engine leaks and deicing, therefore key areas of on-site treatment include parking lots and access drives. Since pollutants typically attach themselves to solid particles, treatment practices are designed to remove suspended solids.

The treatment train for this site includes:

- Parking lot sweeping
- Catch basins with two (2) foot sumps
- Hydrodynamic Separators prior to each detention system.

- Stormwater infiltration within the open-bottom detention galleries

The hydrodynamic separator units will be designed to treat the Water Quality flow in accordance with the 2004 manual, effectively removing floatables, captured sediment solids, and hydrocarbons to achieve a TSS removal rate of 80% (and often 90% or better).

7.0 OPERATION AND MAINTENANCE PLAN

7.1 During Construction

The following maintenance procedures shall be followed by the Contractor for temporary and permanent erosion and sedimentation measures and stormwater treatment systems installed during the construction period:

a. Dust Control: Moisten disturbed soil areas with water periodically, or use a non-asphaltic soil tacifier to minimize dust.

b. Temporary Seeding: Inspect weekly and within 24 hours of a storm generating a discharge. Continue inspection until vegetation is firmly established.

c. Permanent Seeding: Inspect seeded areas weekly and within 24 hours after a storm generating a discharge. Continue inspection until vegetation is firmly established.

d. Temporary Soil Protection: Inspect seeded areas weekly and within 24 hours after a storm generating a discharge.

e. Temporary Erosion Control Mat: Inspect mats weekly and within 24 hours after a storm generating a discharge.

f. Catch Basin Filter Inserts: Inspect the fabric at least once a week and within 24 hours after the end of a storm generating a discharge. Check the fabric for structural soundness (i.e. tears), proper anchoring/alignment within the grate and ability to drain runoff (i.e. percent of clogging by sediment). Remove the sediment every week, or sooner if ponding is excessive. Each time the sediment is removed, replace the section of fabric removed with a new section. Do not remove the sediment and reuse the same section of fabric.

g. Hay Bale/ Silt Fence Barrier: Inspect the barrier at least once a week and within 24 hours after the end of a storm generating a discharge. For dewatering operations, inspect frequently before, during and after pumping operations. Remove the sediment deposits when the depth reaches one half the barrier heights. Repair or replace a barrier within 24 hours of observed failure. Maintain the barrier until the contributing disturbed area is stabilized.

h. Construction Entrance/Exit Pad: Maintain the pad in a condition that will prevent tracking and washing of sediment onto paved surfaces. Place additional clean gravel on top of gravel that has become silted, or remove the silted gravel and replace the gravel to the depth removed with clean gravel, as conditions warrant. Remove immediately all sediment spilled, dropped, washed or tracked onto paved surfaces. Roads adjacent to the construction site shall be cleaned at the end of each day by hand sweeping or sweeper truck.

i. Dewatering Settling Basin (if used): Inspect the basin at least every two hours during periods of use. Remove accumulated sediments when the volume equals one half the provided storage volume.

j. Existing Catch Basins and Sumps: Inspect the sediment traps as specified in "f" above. After final removal of the sediment traps at the end of construction, clean the sump of all silt and debris.

k. New Catch Basins and Sumps: As new catch basins are constructed, a filter insert shall be installed in the unit and a sediment barrier installed around the grate. Inspect the filter and barrier weekly and within 24 hours after a storm generating a discharge. After stabilization of the drainage area entering the catch basin, remove the filter and barrier and clean the basin sump of all silt and debris.

l. Stone or Hay Bale Check Dams: Inspect the check dam at least once a week and within 24 hours after the end of a storm generating a discharge. Remove the sediment deposits when the depth reaches one half the check dam heights. Repair or replace a check dam within 24 hours of observed failure. Maintain the check dam until the contributing disturbed area is stabilized.

m. Temporary Stockpiles: Inspect temporary stockpiles at the end of each workday to ensure that tarps are in place and secured. Temporary stockpiles that are expected to be inactive for more than 30 days should be temporarily seeded (see above).

n. Temporary Sediment Traps: Inspect monthly and within 24 hours after a storm generating a discharge. Sediment and oil shall be removed when the storage volume is reduced by one half, or at least every 6 months during construction.

During construction, the Contractor shall be required to remove accumulated sediment from sediment control measures and water quality measures. Sediment shall be disposed of off-site in a manner and location approved by local and state agencies. Temporary storage of sediment on-site is permissible if it is protected from erosion and stockpiled in a manner that will prevent it from being carried by erosion into adjacent properties or resource areas.

Temporary sediment traps may be removed if the contributing drainage area is stabilized. The area shall be re-graded to match original grades or proposed grades as shown on the plans. The disturbed area shall be temporarily, or permanently seeded and mulched if the area is not to be paved.

For hay bale barriers, the stakes may be removed as soon as the upslope areas have been permanently stabilized. Unless proposed construction requires otherwise, any accumulated sediment shall be left in place and the hay bales left in place or broken up for ground cover.

Upon the stabilization of the contributing drainage area, silt fence shall be inspected for sediment accumulation prior to removal. For sediment depths greater than 6", the sediment shall be re-graded or removed. The silt fence shall be removed by pulling the support posts and cutting the geotextile at the ground level. Re-grade or remove the sediment as necessary and stabilize the disturbed soils by placing temporary or permanent seeding and mulch.

When dewatering has been completed, remove the hay bale barrier, sediment and stone, as appropriate, and re-grade the area to original or proposed grade. Stabilize the disturbed area with temporary or permanent seed and mulch.

After the drainage areas to the new and existing catch basins have been stabilized, the Contractor shall be required to clean all sumps and hoods of debris and silt. In addition, within the limits of work, the Contractor shall clean all storm drain piping of collected silt and debris by flushing with water. If the storm system discharges to ground, a hay bale and silt fence barrier must remain in place at each outfall to capture any sediment or debris carried down by the flushing. If the storm drain system discharges into a public or private drainage collection system, the Contractor must install a means of collecting debris and filtering the sediment from the flushing water in the on-site storm system before discharge to the existing storm system.

7.2 After Construction

After construction is completed and accepted by the Owner, it shall be the responsibility of the Owner to maintain all drainage structures. In addition, the following inspection and maintenance guidelines shall be the responsibility of the Owner, or the Owner's representative, beginning the first year period following construction completion and acceptance, and shall be followed each year thereafter:

a) <u>Parking Lot and Site Cleanup</u>: Inspect on a regular basis not to exceed weekly for litter and debris.

b) <u>Parking Lot and Driveway Sweeping</u>: At least twice a year, with the first occurring as soon as possible after snowmelt and the second not less than 90 days following the first.

c) <u>Catch Basin Sumps</u>: Shall be inspected semi-annually and cleaned when the sump is one half full of silt and / or debris.

d) <u>Hydrodynamic Separator</u>: Shall be inspected and cleaned annually.

e) <u>Landscaped Areas</u>: Inspect semi-annually for erosion or dying vegetation. Repair and stabilize any bare or eroded areas and replace vegetation as soon as possible.

8.0 CONCLUSION

The project has been designed to meet Town and State requirements for stormwater management, drainage sizing, and stormwater quality. Peak flows generated by the site for the 2, 5, 10, 25, 50, and 100-year design storms have been mitigated to less than peak flows under existing conditions. The drainage system has been designed to convey the 10-year design storm and stormwater quality has been provided which meets both the State erosion sedimentation guidelines and the State stormwater quality requirements. There are no anticipated negative impacts on any of the upland review areas identified on this property.